Environmental Noise Assessment

Bohemia Subdivision EIR

Placer County, California

BAC Job # 2005-552

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ENVIRONMENTAL SETTING

Project Location and Description

The proposed Bohemia Subdivision project is located between State Route 49 (SR 49) and Canal Street, just south of the Union Pacific Railroad (UPRR), in Placer County, California. The project includes the proposed construction of 119 residential parcels with both single-family and half-plex dwellings. Alternatives to the project include the Current Base Zoning Plan (Alternative 2), which includes retail commercial/office land use on the west side and multi-family residential on the east; and the Tree Preservation/Park Plan (Alternative 3), which is a single-family residential plan including a centralized park. The two alternatives to the project include a connection to SR 49 via Hulbert Way. Please see the proposed project design in Figure 1. The project alternatives are presented in Figures 2 and 3.

Acoustical Terminology

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second, or Hertz (Hz). Human hearing is generally capable of detecting sound between 20 Hz and 20,000 Hz.

Human hearing is generally capable of processing these pressure variations (sound) over an extremely broad dynamic range; therefore, the measurement of sound directly in terms of pressure would require a very large and awkward range of numbers. The logarithmic treatment of these numbers – converting measured sound pressure (Pa) into sound pressure level (decibels, dB) – was devised primarily to limit the range of numbers; the decibel scale allows for 5 orders of magnitude in sound pressure to be expressed as a range of 100 dB.

The perceived loudness of sounds is dependent on many factors including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable and can be approximated by the A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives noise. For this reason, the A-weighted sound level has become a standard tool for environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels.

Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool used to measure the ambient noise level is the average or equivalent sound level (L_{eq}), which corresponds to a steady-state A-weighted sound level

containing the same total energy as a time-varying signal over a given time period (usually one hour). The L_{eq} is the foundation for the Day/Night Average Noise Level (L_{dn}).

The L_{dn} is based on the average noise level over a continuous 24-hour period, with a +10 dB weighting applied to noise occurring during nighttime (10 p.m. to 7 a.m.) hours. The nighttime penalty is based on the assumption that people react to nighttime noise exposures as though they are twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

Table 1 provides definitions of acoustical terminology relevant to this study.

TABLE 1

ACOUSTICAL TERMINOLOGY

Acoustics	The science (or physics) of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
A-Weighting	A frequency-response filter that conditions a given sound signal to approximate human response.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours (10 p.m. - 7 a.m.) weighted by a factor of 10 prior to averaging.
Decibel or dB	A Bel is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bel.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
L_{dn}	Day/Night Average Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
L_n	The measured sound pressure level exceeded (n) percent of the time.
SEL	A single-number rating indicating the total energy of a discrete noise event compressed into a 1-second time duration.

Existing Land Uses in the Project Vicinity

The project site is currently vacant land previously occupied by a lumber production operation. It is currently bordered to the north by single-family residences and the UPRR, to the south by the proposed “The Plaza” commercial development property (currently vacant) and a PG&E construction yard, to the west by SR 49 and commercial/light industrial uses, and to the east by single-family residences.

Noise-sensitive land uses in the immediate project vicinity include existing single-family residences to the north and east. Noise-producing land uses in the project vicinity include the existing commercial/light industrial operations to the west, the existing PG&E construction yard to the south, and the proposed "The Plaza" commercial development to the south. Please refer to Figure 1.

Existing Noise Environment in the Project Vicinity

The existing ambient noise environment in the immediate project vicinity is defined primarily by traffic on SR 49, UPRR train operations, and activities at the PG&E construction yard and commercial/light industrial facilities.

Ambient and Reference Noise Level Measurements

To quantify the existing ambient noise environment in the project vicinity, 24-hour ambient noise level measurement surveys were conducted at three locations on and in the vicinity of the project site on July 11-12, 2005. The noise measurement locations are shown in Figure 1. Measurements were completed at Site A (southwest side near SR 49), Site B (south side adjacent to the PG&E construction yard), and Site C (north side – backyard of residence at 12200 Dyer Court adjacent to the UPRR tracks).

In addition to the long-term (24-hour) measurements, short-term reference noise level measurements were completed on the west side of the project property to document existing noise exposure from the two commercial/light industrial operations. These measurements were completed during the afternoon of August 3, 2005, and included noise exposure from California Hardwood Producers, Inc. and an unknown firewood storage/retailing operation. The measurement sites are presented as Sites 1 and 2 in Figure 1.

Larson-Davis Laboratories (LDL) Model 820 precision integrating sound level meters were used for all of the noise level measurement surveys. The meters were calibrated before use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute (ANSI) for Type 1 (precision) sound level meters (ANSI S1.4).

Summaries of the long-term ambient noise level survey results are presented in Figures 4-6. Noise exposure at Sites A and C were dominated by traffic (SR 49) and train operations, respectively. Noise from the commercial operations to the northwest of Site A did not contribute significantly to the noise exposure at this site. With the exception of the northwestern boundary of the project site, which is impacted by train noise, existing noise

levels in the immediate project vicinity were consistent with typical commercial/residential land uses in urban/suburban settings.

Roadway Traffic

To predict existing noise levels due to traffic, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The Model is based on the Calveno reference noise factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the project site. The FHWA Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions. A day/night traffic distribution of 83%/17% was factored into the calculations to determine L_{dn}. Additionally, medium/heavy truck splits of 2%/1% and 1%/1% were use for SR 49 and other study roadways, respectively, along with traffic speeds of 30-45 MPH.

Traffic volumes for existing conditions were obtained from the Traffic Impact Study prepared for the project by Omni-Means Transportation Consultants (November 2005). The data within this report is in the form of PM peak-hour intersection turning movements, and was converted to ADT by Bollard Acoustical Consultants, Inc. staff.

Table 2 shows the existing traffic noise levels in terms of L_{dn} at a reference distance of 75-100 feet from the centerlines of existing project-area roadways. Table 2 also includes the distances to existing traffic noise contours.

TABLE 2

EXISTING TRAFFIC NOISE LEVELS AND CONTOUR DISTANCES
BOHEMIA SUBDIVISION – PLACER COUNTY, CALIFORNIA

			Distance to Contours (feet)		
Roadway	**Segment**	**L_{dn}, dB @ 75 Feet (100 Feet for SR 49)**	**70 dB L_{dn}**	**65 dB L_{dn}**	**60 dB L_{dn}**
SR 49	North of New Airport Road	69	82	177	380
	New Airport Road – Hulbert Way	69	92	198	426
	Hulbert Way – Luther Road	69	92	198	426
	South of Luther Road	69	87	188	404
Luther Road	West of SR 49	56	9	19	40
	SR 49 – Canal Street	61	18	39	84
	Canal Street – Taylor Lane	60	16	35	76
	Taylor Lane – Dairy Road	60	17	37	81
	East of Dairy Road	60	17	36	77
Canal Street	North of Luther Road	53	5	11	24
	South of Luther Road	43	1	3	6

Source: FHWA-RD-77-108 with inputs from Omni-Means and Bollard Acoustical Consultants, Inc.

Railroad

As described above, the project site is directly adjacent to a branch of the UPRR along the northwest property boundary. Long-term (24-hours) noise measurements at Site C, approximately 120 feet from the centerline of the tracks, recorded a total of eight train events (5 daytime/3 nighttime) during the measurement period. The calculated noise exposure from train events at this measurement site was approximately 68 dB L_{dn} at 120 feet from the centerline of the tracks, and accounts for a majority of the existing ambient noise exposure measured at this site.

PG&E Construction Yard

The project site is directly adjacent to a PG&E construction yard on the southwest corner of the property. Long-term (24-hour) noise measurements at Site B on the property line directly adjacent to the PG&E facility yielded an L_{dn} of 55 dB. Measured maximum Hourly

L_{eq}s of 65 dB and 49 dB were recording during daytime and nighttime hours, respectively. Measured maximum levels (L_{max}) were as-high-as 83 dB and 70 dB during the daytime and nighttime, respectively. Based on the detailed measurement results, it is expected that the measured daytime noise exposure was primarily due to activities on the PG&E construction site with minor contribution from local and distant traffic.

Bollard Acoustical Consultants, Inc. staff contacted Mr. Justin Smith (CRE), the area Land Agent for PG&E, on December 15, 2005 and January 6, 2006 to discuss the operations at the PG&E construction yard. Mr. Smith explained that the yard is used by several different PG&E departments (e.g., Hydro Construction, General Construction (GC) Line, Equipment Maintenance, GC Gas, Paint, Administration, etc.), and that it is difficult to know what operations might occur on the site from day-to-day. This information was corroborated during our conversation with Mr. Mike McKinney (January 6, 2006), a Field Clerk for the GC Line division at the PG&E construction yard. Based on this information, it is our opinion that the noise measurement data collected at Site B accurately represents typical activity on the PG&E construction yard, and is appropriate for use in the following analysis.

Commercial/Light Industrial Facilities

The project site is directly adjacent to two commercial/light industrial operations to the west. One of these operations is California Hardwood Producer, Inc., while the other is a firewood storage/retail facility. Short-term reference noise level measurements at Sites 1 and 2 revealed average and maximum noise levels in the range of 52-54 dB and 58-66 dB, respectively, due to typical activities at the facilities. Measured noise sources included saws and mobile equipment. Please see Figure 1 for the locations of the measurement sites. These sites are representative of the closest proposed noise-sensitive uses to the noise sources.

REGULATORY SETTING

In order to limit population exposure to physically and/or psychologically damaging noise levels, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. The Auburn Bowman Community Plan and CEQA provide regulations regarding noise levels for uses relevant to the proposed project. The following provides a general overview of the existing regulations established by the Community Plan and CEQA.

Auburn Bowman Community Plan Criteria

Transportation Noise Sources

The Auburn Bowman Community Plan requires that interior noise exposure from exterior noise sources within residential dwellings not exceed 45 dB L_{dn} (or CNEL), regardless of exterior noise exposure.

The Plan established an exterior noise level criterion of 60 dB L_{dn} or less within the property line of residential and commercial land uses. This is considered to be the normally acceptable criterion and may be adjusted upward (typically 60-65 dB L_{dn}, or 70 dB L_{dn} for train noise) based on compliance with the interior noise-exposure criterion and the County's discretion.

Non-Transportation Noise Sources

Additionally, the Auburn Bowman Community Plan applies the hourly performance standards presented in Table 3 for new noise-sensitive projects affected by non-transportation noise sources. It is expected that these criteria will apply to the proposed residential and retail commercial/office land uses.

TABLE 3

HOURLY NOISE LEVEL PERFORMANCE CRITERIA
NEW RESIDENTIAL PROJECTS AFFECTED BY NON-TRANSPORTATION NOISE SOURCES
AUBURN BOWMAN COMMUNITY PLAN

Noise Metric	Daytime (7 a.m.-10 p.m.)	Nighttime (10 p.m.-7 a.m.)
Hourly L_{eq}, dB	50	45
L_{max}, dB	70	65

Note: Each of the noise levels presented above shall be lowered by 5 dB for noise consisting of simple tones, speech and/or music, or impulsive events.

Standards of Significance

Local Land Use Planning Criteria

Generally, a project may have a significant effect on the environment if it will substantially increase the ambient noise levels at adjoining areas or expose people to severe noise levels. In practice, more specific professional standards are usually provided, as discussed above. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local planning criteria.

Significance of Changes in Ambient Noise Levels

The potential increase in traffic noise from the project is a factor in determining significance. Research into the human perception of changes in sound level indicates the following.

- A 3 dB change is barely perceptible,
- A 5 dB change is clearly perceptible, and
- A 10 dB change is perceived as being twice or half as loud.

For this project, a 3 dB (or greater) increase in traffic noise exposure at existing noise-sensitive properties due to project traffic volume increases will be considered a significant impact.

IMPACTS AND MITIGATION MEASURES ANALYSIS

Project-Related Noise Impacts

The identified noise-producing elements associated with this project are increased traffic noise on the local roadway network, operations/activities within the proposed retail commercial/office land (Alternative 2), and project-related construction. This analysis focuses on these noise sources.

Roadway Traffic

To assess noise impacts due to project-related traffic increases on the local roadway network, traffic noise levels were predicted at a representative distance (100 feet from the center of SR 49 and 75 feet from the center of all other study roadways) for all of the "Project" and "No Project" traffic conditions. The traffic noise levels were predicted using the same modeling methodology described in the Environmental Setting section above. The "Project" levels were compared to the "No Project" levels to determine the project

contribution to the local traffic noise environment. A summary of the predicted traffic noise levels is presented in Table 4.

TABLE 4

PREDICTED TRAFFIC NOISE LEVELS
100 FEET FROM SR 49 AND 75 FEET FROM ALL OTHER STUDY ROADWAYS
BOHEMIA SUBDIVISION – PLACER COUNTY, CALIFORNIA

		L_{dn}, dB (change w/ respect to No Project condition, dB)			
Roadway	**Segment**	**Short-Term + Project w/o Connection**	**Short-Term + Project w/ Connection**	**Cumulative (2025) + Project w/o Connection**	**Cumulative (2025) + Project w/ Connection**
SR 49	North of New Airport Road	70 (0)	70 (0)	71 (0)	71 (0)
	New Airport Road – Hulbert Way	70 (0)	70 (0)	72 (0)	72 (0)
	Hulbert Way – Luther Road	70 (0)	70 (0)	72 (0)	72 (0)
	South of Luther Road	70 (0)	70 (0)	71 (0)	71 (0)
Luther Road	West of SR 49	56 (0)	56 (0)	56 (0)	56 (0)
	SR 49 – Canal Street	62 (0)	61 (-1)	64 (0)	64 (0)
	Canal Street – Taylor Lane	61 (0)	61 (0)	63 (0)	63 (0)
	Taylor Lane – Dairy Road	62 (+1)	62 (+1)	64 (0)	64 (0)
	East of Dairy Road	61 (0)	61 (0)	63 (0)	63 (0)
Canal Street	North of Project Access	53 (0)	53 (0)	56 (0)	56 (0)
	Project Access – Luther Road	55 (+2)	52 (-1)	58 (+2)	54 (-2)
	South of Luther Road	43 (0)	43 (0)	51 (0)	51 (0)

Source: FHWA-RD-77-108 with inputs from Omni-Means and Bollard Acoustical Consultants, Inc.

Project Construction

During the construction phases of the project, noise from building equipment would add to the noise environment in the immediate project vicinity. Activities involved in construction would likely generate maximum noise levels, as indicated in Table 5, ranging from 85-88 dB at a distance of 50 feet. Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours (7 a.m.-5 p.m.). Still, residences located along the east side of the project site will likely be affected by this noise.

TABLE 5

CONSTRUCTION EQUIPMENT NOISE LEVELS

Type of Equipment	L_{max}, dB at 50 feet
Bulldozers	87
Heavy Trucks	88
Backhoe	85
Pneumatic Tools	85

Source: Environmental Noise Pollution, Patrick R. Cunniff, 1977.

Noise would also be generated during the construction phase(s) by increased truck traffic on local area roadways. A significant project-generated noise source would be truck traffic associated with the transport of heavy materials and equipment to and from the construction site.

Noise Impacts on the Project

The project site may be impacted by traffic noise from SR 49, train operations on the UPRR, activities at the existing PG&E construction yard to the south, existing commercial/light industrial uses to the west, and future “The Plaza” commercial development to the south are examined herein.

Roadway Traffic

Exterior Noise

As shown in Table 4, unmitigated Cumulative (2025) + Project traffic noise exposure from SR 49 is estimated to be approximately 72 dB L_{dn} at 100 feet from the center of the roadway. For this project, the closest proposed noise-sensitive land uses will be approximately 420 feet from the center of SR 49. Assuming a standard noise level adjustment of +/- 4.5 dB per halving/doubling of distance from the noise source, estimated future, unmitigated traffic noise exposure from SR 49 will be approximately 63 dB L_{dn} at the closest project property line.

We estimate that existing and proposed future buildings to the west and south of the project will provide some acoustical shielding from traffic on SR 49. However, the level of attenuation from these buildings is not known, and would be exceedingly difficult to calculate accurately. As a conservative measure, we recommend the construction of a standard noise barrier measuring no less than 6 feet high above the existing project ground elevation to mitigate future predicted SR 49 traffic noise exposure at the closest proposed noise-sensitive uses. It is expected that this barrier will provide more than the required sound insulation to meet the applicable 60 dB L_{dn} exterior noise exposure criterion within the closest proposed noise-sensitive properties to SR 49.

The above-described property-line noise barriers may also be required to mitigate noise exposure from the existing and proposed adjacent commercial/light industrial operations to the west and south of the project. The precise height of this noise barrier will be determined based on the analyses for these specific noise sources presented below.

Interior Noise

As described above, future, unmitigated exterior traffic noise exposure from SR 49 could be as-high-as 63 dB L_{dn} at first-floor receivers closest to the roadway. Future SR 49 noise exposure at second-floor project buildings could be as-high-as 65 dB L_{dn} (2 dB higher than at ground level) given that there would be reduced ground absorption at these locations and any property line noise barrier would provide little noise mitigation at elevated facades.

Typical residential construction, like the existing homes in the project vicinity, is expected to provide no less than 25 dB of exterior-to-interior noise level reduction (NLR) regarding transportation and most other exterior noise sources. This assumes that exterior windows and door are closed. Given a worst-case exterior traffic noise exposure level of 65 dB L_{dn}, interior traffic noise exposure may be as-high-as 40 dB L_{dn}. This level does not exceed the

Community Plan interior noise exposure criterion. Therefore, no noise-mitigating building construction improvements would be required.

Union Pacific Railroad

Exterior Noise

Measurements of existing train noise in the project vicinity yielded a total of five daytime operations and three nighttime operations producing an unmitigated noise exposure of 68 dB L_{dn} at 120 feet from the centerline of the tracks. No future operations data is available for the UPRR adjacent to the project site, and it is not expected that operations on this section of track will change significantly within the foreseeable future.

The closest proposed noise-sensitive property to the UPRR tracks will be approximately 175 feet away. Assuming standard noise attenuation of +/- 4.5 dB per halving/doubling of distance from the source, estimated unmitigated train noise exposure at the closest proposed noise-sensitive properties will be approximately 65 dB L_{dn}. This exceeds the applicable 60 dB L_{dn} normally acceptable exterior noise exposure criterion.

To mitigate this noise exposure, we recommend the construction of a noise barrier along the north side of the closest proposed residences to the Railroad. Based on our calculations, a 6-foot high noise barrier at this location would be sufficient to mitigate UPRR train noise exposure to 60 dB L_{dn} or less.

Interior Noise

Unmitigated train noise exposure at the closest-proposed first-floor residential building facades may be as-high-as 65 dB L_{dn}. Second-floor building facades facing the tracks may experience train noise levels as-high-as 67 dB L_{dn} (+2 dB higher than at the first-floor) given the reduced effect of ground attenuation at elevated receiver locations. We can also assume that the recommended property line noise barrier would provide little noise attenuation at elevated locations.

Assuming a minimum 25 dB exterior-to-interior NLR for the closest project homes, interior train noise exposure would not be expected to exceed 42 dB L_{dn}. This exposure does not exceed the Community Plan's 45 dB L_{dn} limit. Therefore, no noise-mitigating construction improvements are warranted for project homes adjacent to the UPRR tracks.

PG&E Construction Yard

Exterior Noise

Maximum existing ambient noise exposure in the vicinity of the closest proposed noise-sensitive land uses to the PG&E construction yard was recorded to be approximately 65 dB L_{eq} and 83 dB L_{max} during daytime hours, and 49 dB L_{eq} and 71 dB L_{max} during nighttime hours. This exposure is 13-15 dB and 4-6 dB higher than the applicable daytime and nighttime exterior noise exposure standards, respectively.

A noise barrier performance analysis was completed to determine the height of the noise barrier required to meet the established 50 dB daytime Hourly L_{eq} exterior noise exposure standard at the closest proposed noise-sensitive uses to the north and west of the existing PG&E construction yard. A barrier height of no less than 19 feet high above the existing project ground elevation (PG&E yard elevation) would be required. A standard 6-foot noise barrier would provide approximately 5 dB of insertion loss, reducing the expected worst-case PG&E noise exposure at the closest proposed uses to 60 dB L_{eq} and 78 dB L_{max} during daytime hours, and 44 dB L_{eq} and 66 dB L_{max} during nighttime hours.

In our opinion, the construction of a 19-foot high noise barrier along the PG&E boundary is excessive based on the recorded ambient noise measurement data. We feel that the construction of a standard 6-foot high barrier combined with disclosure of the potential for intermittent PG&E noise exposure would be an appropriate noise mitigation alternative.

Interior Noise

A 6-foot high noise barrier along the shared project and PG&E property line would likely provide very little noise attenuation at upper-floor residential building facades facing the PG&E facility. In addition, reduced ground attenuation at elevated receivers may produce slightly higher noise levels than experienced at ground-floor elevations. Therefore, PG&E-related noise exposure at second-floor building facades facing the construction yard could be as-high-as 67 dB L_{eq} and 85 dB L_{max} during daytime hours, and 51 dB L_{eq} and 73 dB L_{max} during the nighttime hours, based on the ambient noise level data measured at Site B.

Assuming a 25 dB exterior-to-interior NLR for the closest second-floor project homes to the PG&E construction yard, interior noise exposure could be as-high-as 42 dB L_{eq} and 60 dB L_{max} during daytime hours, and 26 dB L_{eq} and 48 dB L_{max} during nighttime hours. These levels are assumed to be approximately 7 dB higher than those within first-floor project rooms due to the ground attenuation offset and the ineffectiveness of the recommended 6-foot high property line noise barrier.

Interior noise exposure within second-floor project rooms adjacent to the PG&E construction yard could be mitigated by as-much-as 5 dB with the installation of acoustically rated windows at building facades with line-of-sight to the noise source. In this case, we recommend the installation of STC 35+ window assemblies.

Existing Commercial/Light Industrial Facilities

Exterior Noise

As presented above, reference measurements of noise exposure from the existing hardwood and firewood facilities to the west of the project site yielded levels of 52-54 dB L_{eq} and 58-66 dB L_{max}. The measurement locations, noted as Sites 1 and 2 in Figure 1, were representative of the closest proposed noise-sensitive uses to the noise sources. Based on these measurement results, it is expected that noise exposure from these existing facilities will exceed the established 50 dB L_{eq} exterior daytime noise exposure criterion. These facilities are not expected to operate during nighttime hours.

It is expected that the 6-foot high noise barrier recommended for SR 49 traffic noise mitigation will provide adequate noise insulation from existing commercial/light industrial operations to the west.

Interior Noise

Noise exposure from the existing commercial/light industrial uses to the west of the project homes could produce interior noise exposure at second-floor rooms as-high-as 31 dB L_{eq} and 43 dB L_{max}. These levels assume no mitigation from the recommended property line noise barriers and a +2 dB increase in noise exposure due to reduced ground attenuation. It is our professional opinion that these noise exposure levels do not warrant additional noise-mitigating building construction improvements for homes closest to the existing commercial/light industrial sources.

Future “The Plaza” Commercial Development

The proposed “The Plaza” commercial development will be located to the south of the project site, as shown in Figure 1. Noise sources associated with “The Plaza” which may impact the proposed project include rooftop mechanical systems (HVAC), heavy truck movements, and loading dock activities. Since it is not yet known what retailers will occupy the development, and information like truck operations, hours of operation, and HVAC design and usage are not known, it is not possible to quantify the noise exposure produced

by this facility. However, based on the distance between proposed Building A and the closest proposed noise-sensitive receivers (approximately 250 feet) and our experience with similar projects, it is our professional opinion that noise exposure from "The Plaza" may be adequately mitigated using noise barriers of typical height and design.

Bollard Acoustical Consultants, Inc. recommends that a detailed acoustical analysis be prepared for "The Plaza" to determine appropriate noise-mitigating construction once detailed information regarding the development is available.

SPECIFIC IMPACTS AND MITIGATION STATEMENTS

The following applies to the proposed project and all project alternatives, except where noted.

Impact 1

Impacts of off-site traffic noise on on-site noise-sensitive uses: The project site is located adjacent to SR 49. As presented above, unmitigated Cumulative (2025) + Project traffic noise exposure on the project site may be as-high-as 63 dB L_{dn}, exceeding the 60 dB L_{dn} exterior noise criterion. *Therefore, this impact is considered to be significant.*

Calculated Cumulative (2025) + Project traffic noise exposure within the closest proposed project residences is not expected to exceed 40 dB L_{dn}. This noise exposure level does not exceed the applicable 45 dB L_{dn} limit. *Therefore, this impact is considered to be less than significant.*

Mitigation 1

To mitigate future exterior traffic noise exposure from SR 49 at the closest proposed homes, Bollard Acoustical Consultants, Inc. recommends the construction of 6-foot high noise barriers at select locations along the west project boundary. Please refer to Figures 1-3 for the recommended noise barrier locations.

Impact after Mitigation

Less than significant.

Impact 2

Project-related increases in off-site traffic noise exposure: The project will affect traffic volumes and associated traffic noise exposure on existing local area roadways. As shown in Table 4, project-related traffic noise changes relative to no-project levels will be in the range of -2 dB to +2 dB. The potential noise exposure increase due to the project does not exceed the significance criterion established for this project. *Therefore, this impact is considered to be less than significant.*

Mitigation 2

None required.

Impact 3

Union Pacific Railroad noise levels on the project site: As described above, existing (and expected future) operations on the UPRR produce unmitigated noise exposure at the closest proposed noise-sensitive uses of approximately 65 dB L_{dn}. This level exceeds the established "normally acceptable" 60 dB L_{dn} exterior noise exposure criterion. *Therefore, this impact is considered to be significant.*

Unmitigated train noise exposure within the closest proposed project residences is not expected to exceed 42 dB L_{dn}. This noise exposure level does not exceed the applicable 45 dB L_{dn} limit. *Therefore, this impact is considered to be less than significant.*

Mitigation 3

To mitigate exterior UPRR train noise exposure on the project site, Bollard Acoustical Consultants, Inc. recommends the construction of a 6-foot high property-line noise barrier along the north boundary. Please refer to Figures 1-3 for the recommended noise barrier location.

Impact after Mitigation 3

Less than significant.

Impact 4

PG&E construction yard noise levels on the project site: As described above, average existing (and expected future) noise exposure from the PG&E construction yard is

approximately 65 dB L_{eq} and 83 dB L_{max} during daytime hours, and 49 dB L_{eq} and 71 dB L_{max} during nighttime hours (based on worst-case measurement data) at the closest proposed noise-sensitive uses on the project site. These levels exceed the established exterior noise exposure criteria by as-much-as 15 dB L_{eq} and 13 dB L_{max}. *Therefore, this impact is considered to be significant.*

In addition, interior noise exposure within second-floor rooms adjacent to the PG&E operations could be as-high-as 42 dB L_{eq} and 60 dB L_{max} during daytime hours, and 26 dB L_{eq} and 48 dB L_{max} during nighttime hours. *This impact is considered to be potentially significant.*

Mitigation 4

Bollard Acoustical Consultants, Inc. recommends the construction of a standard 6-foot high noise barrier along portions of the south and east property lines near the PG&E facility. Please refer to Figures 1-3. This barrier is expected to provide approximately 5 dB of insertion loss (noise level reduction), mitigating worst-case exterior noise exposure to 60 dB L_{eq} and 78 dB L_{max} during daytime hours, and 44 dB L_{eq} and 66 dB L_{max} during nighttime hours. In addition, we recommend that the project developer disclose the potential for moderate noise exposure at all proposed homes and offices directly adjacent to the PG&E facility.

Additionally, we recommend that the project developer incorporate sound transmission class (STC) 35 or higher windows at second-floor building facades with line-of-sight to the PG&E construction yard. This construction improvement should be completed at the proposed homes directly adjacent to the construction yard.

Impact after Mitigation 4

Exterior noise exposure from the PG&E construction yard may still exceed the applicable noise exposure criteria with the construction of the recommended 6-foot high noise barrier. *Therefore, this impact is considered to be significant and unavoidable.*

Impact 5

Construction noise impact: Activities associated with the project construction will result in elevated noise levels with maximum noise levels ranging from 85-88 dB at 50 feet as shown in Table 5. Although these levels would be audible at the nearest existing noise-sensitive receivers, they would be temporary in nature and would likely occur during normal daytime working hours. Nonetheless, because construction activities would result in periods of elevated noise levels, *this impact is considered to be potentially significant.*

Mitigation 5

All construction activities should adhere to the construction practices established by the Auburn Bowman Community Plan including limiting construction activities to the daytime hours and requiring all internal combustion engines to be fitted with factory specified mufflers.

Impact after Mitigation 5

Less than significant.

Impact 6

Noise impact from neighboring commercial/industrial uses: Noise exposure generated by existing hardwood flooring fabrication and firewood operations to the west of the project site were measured to be approximately 52-54 dB L_{eq} and 58-66 dB L_{max} during daytime hours at the locations of the closest proposed noise-sensitive uses. These measurement results are assumed to represent typical operations at these facilities. As measured, unmitigated exterior noise exposure would exceed the applicable daytime standard of 50 dB L_{eq}. *Therefore, this impact is considered to be significant.*

Interior noise exposure from the existing commercial/industrial uses within the closest proposed project homes would not be expected to exceed 29 dB L_{eq} and 41 dB L_{max}. *This impact is considered to be less than significant.*

Mitigation 6

It is expected that the construction of the property-line noise barrier discussed in Mitigation 1 will provide the noise insulation required for compliance with the applicable noise criteria.

Impact after Mitigation 6

Less than significant.

Impact 7

Noise impact from future "The Plaza" commercial development: Noise impacts from this project on the proposed project may not be calculated accurately until detailed information regarding "The Plaza" occupants is known: Information pertaining to truck operations, HVAC equipment design, and operations hours will be critical in determining

future noise exposure generated by this facility. However, based on our experience with similar projects, it is expected that unmitigated noise exposure related to the proposed Building A at "The Plaza" may exceed the applicable exterior noise exposure performance criteria. *Therefore, this impact is considered to be potentially significant.*

Mitigation 7

Bollard Acoustical Consultants, Inc. recommends that a detailed acoustical analysis be performed for "The Plaza" once detailed information regarding its occupants is available. It is expected that the applicable noise standards may be met through incorporation of standard noise control measures.

Impact after Mitigation 7

Less than significant.

Impact 8

Noise impact from future commercial development on the project site (Alternative 2): Noise impacts from any project-related commercial uses on existing or future residential uses may not be calculated accurately until detailed information regarding the commercial occupants is known: Information pertaining to truck operations, HVAC equipment design, and operations hours will be critical in determining future noise exposure generated by these uses. *Therefore, this impact is considered to be potentially significant.*

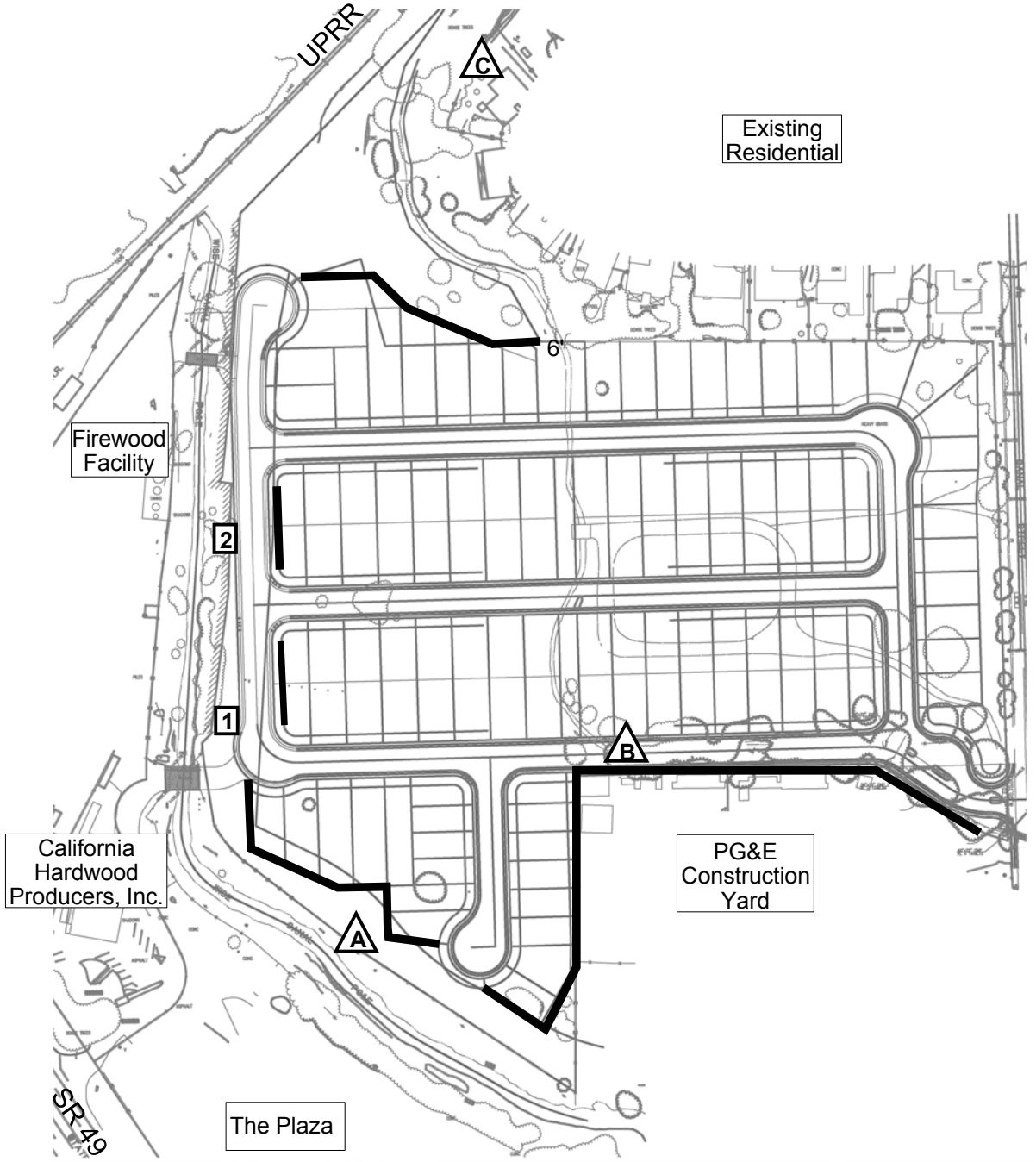
Mitigation 8

Bollard Acoustical Consultants, Inc. recommends that a detailed acoustical analysis be performed for proposed project-related commercial uses once detailed information regarding these uses is available. The acoustical analysis would be completed to ensure that noise exposure from the commercial development complies with the applicable noise criteria at the closest project homes.

Impact after Mitigation 8

Less than significant.

Figure 1
Project Site Plan
Bohemia Subdivision - Placer County, California



N Reference Measurement Site

L Ambient Measurement Site

Recommended 6- Foot High Noise Barrier

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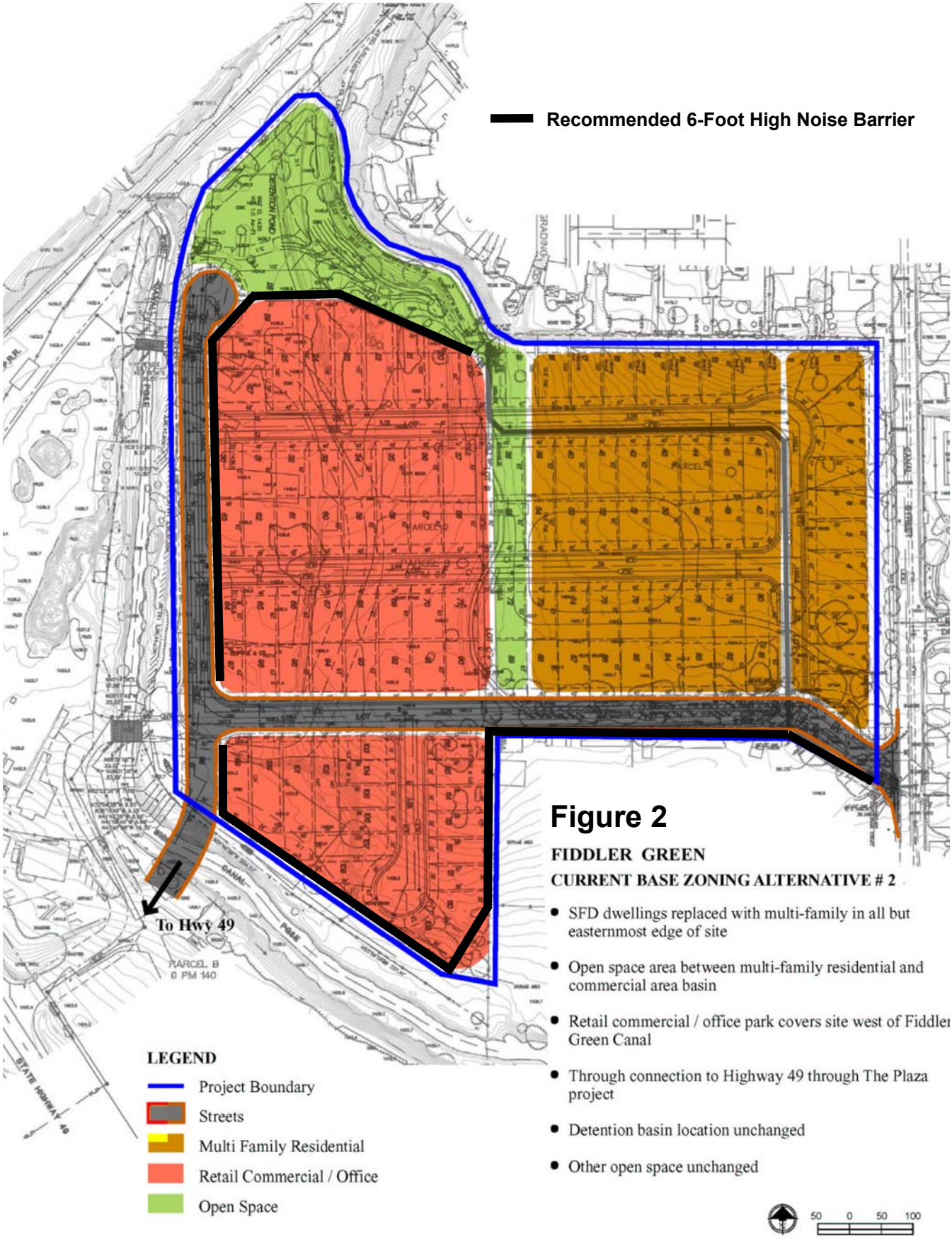

Figure 2

FIDDLER GREEN

CURRENT BASE ZONING ALTERNATIVE # 2

- SFD dwellings replaced with multi-family in all but easternmost edge of site
- Open space area between multi-family residential and commercial area basin
- Retail commercial / office park covers site west of Fiddler Green Canal
- Through connection to Highway 49 through The Plaza project
- Detention basin location unchanged
- Other open space unchanged

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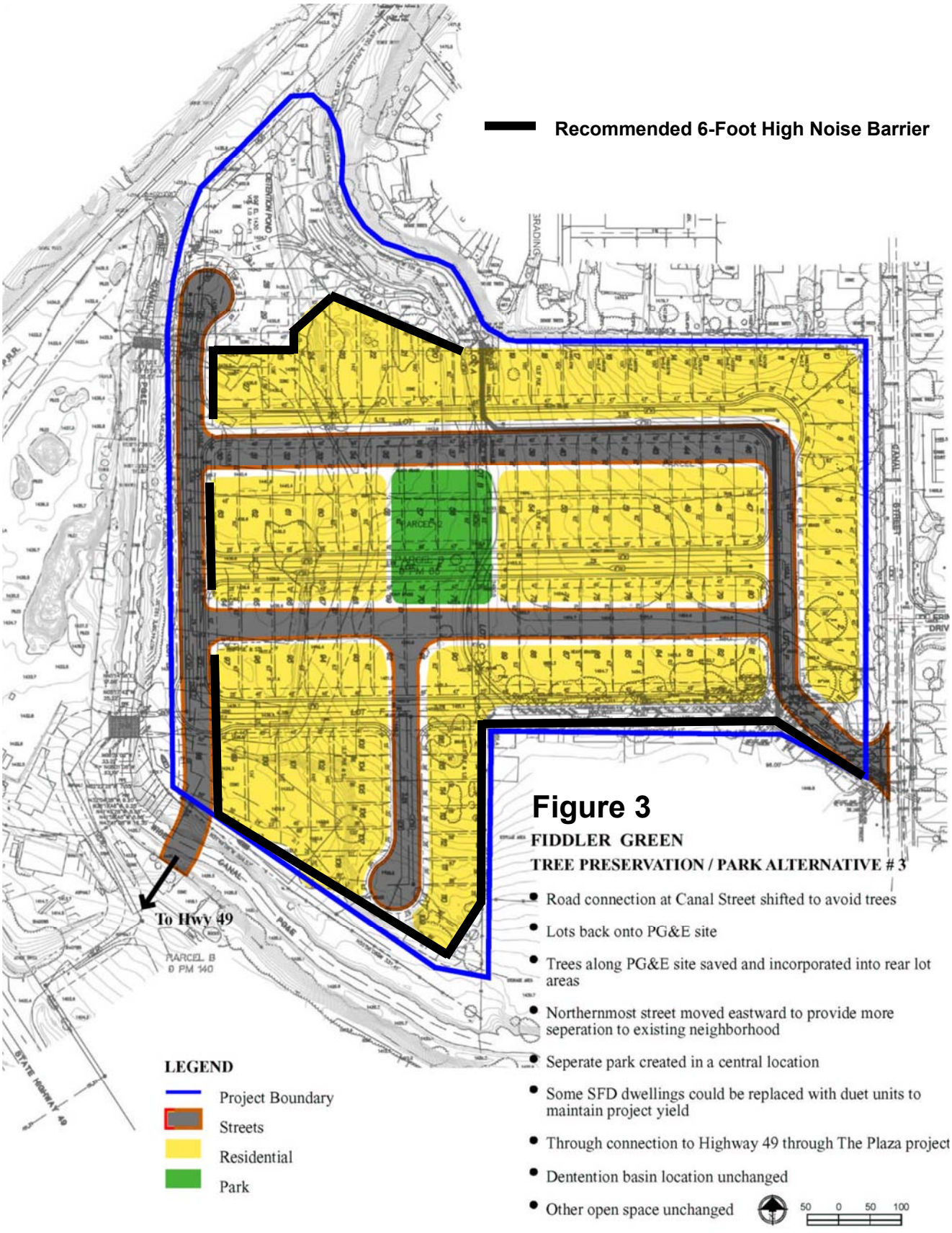

Figure 3

FIDDLER GREEN

TREE PRESERVATION / PARK ALTERNATIVE # 3

- Road connection at Canal Street shifted to avoid trees
- Lots back onto PG&E site
- Trees along PG&E site saved and incorporated into rear lot areas
- Northernmost street moved eastward to provide more seperation to existing neighborhood
- Seperate park created in a central location
- Some SFD dwellings could be replaced with duet units to maintain project yield
- Through connection to Highway 49 through The Plaza project
- Dentention basin location unchanged
- Other open space unchanged

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Figure 4
Measured Ambient Noise Levels - Site A
Bohemia Subdivision - Placer County, California
July 11-12, 2005

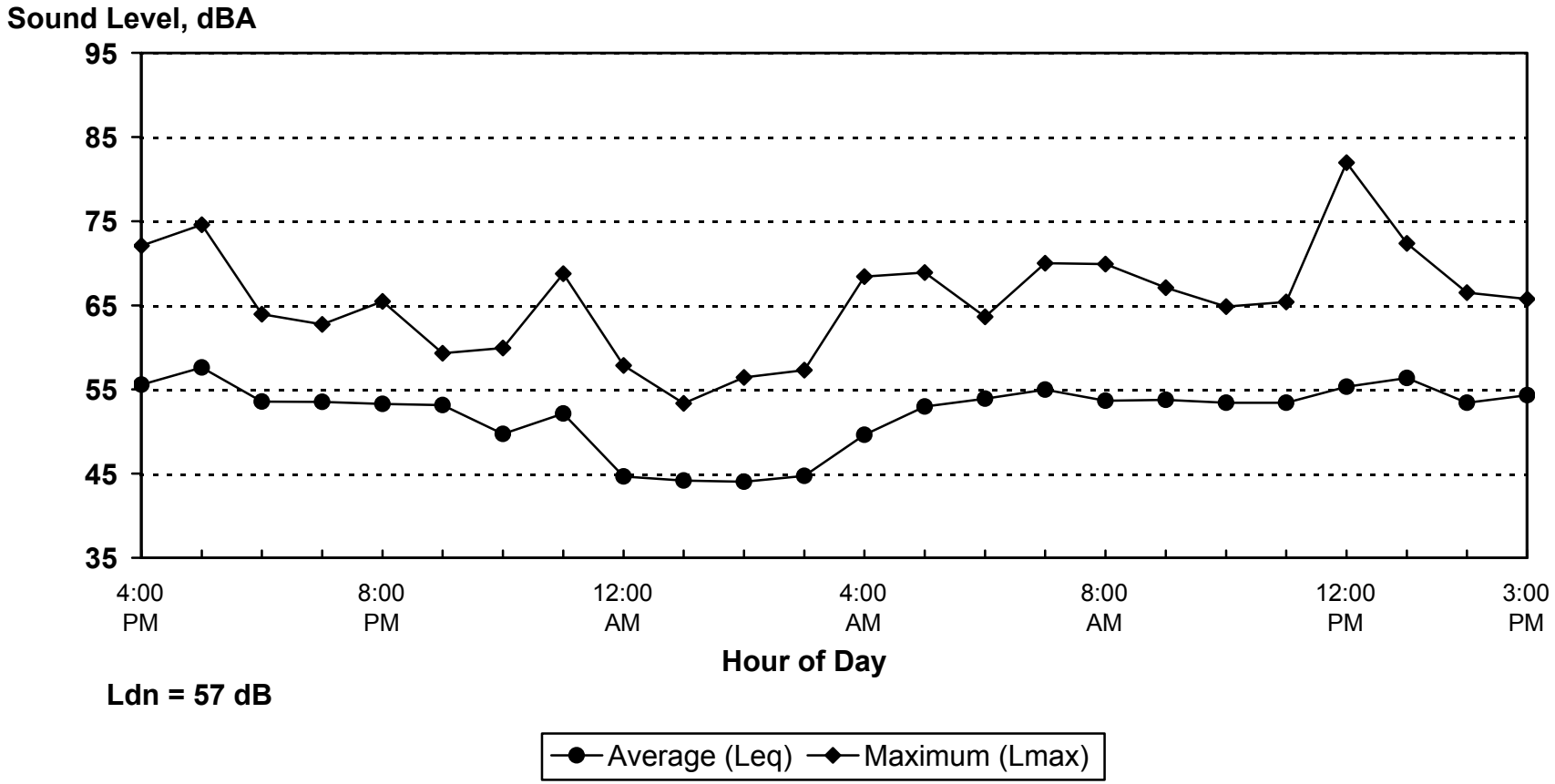

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Figure 5
Measured Ambient Noise Levels - Site B
Bohemia Subdivision - Placer County, California
July 11-12, 2005

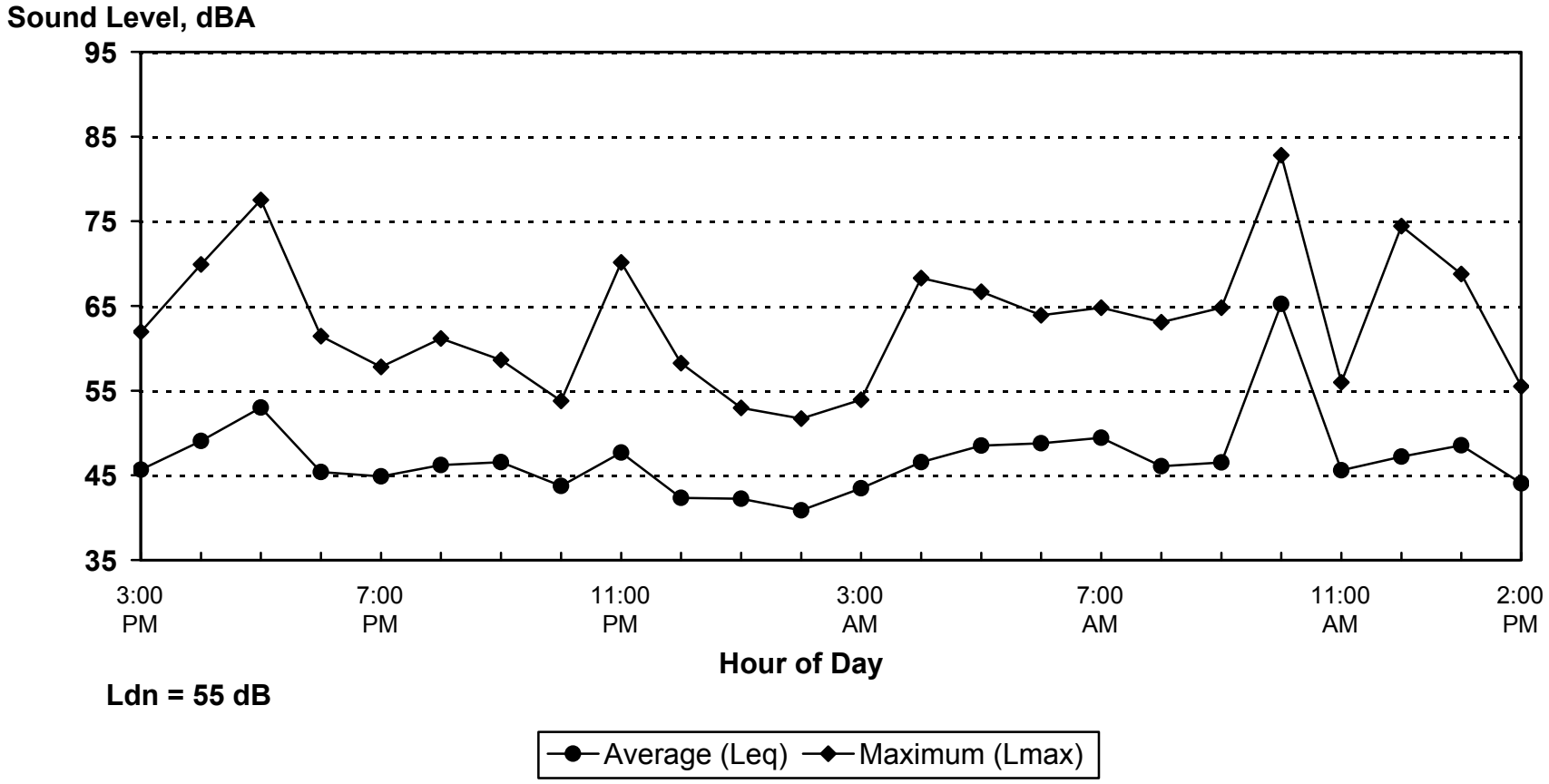

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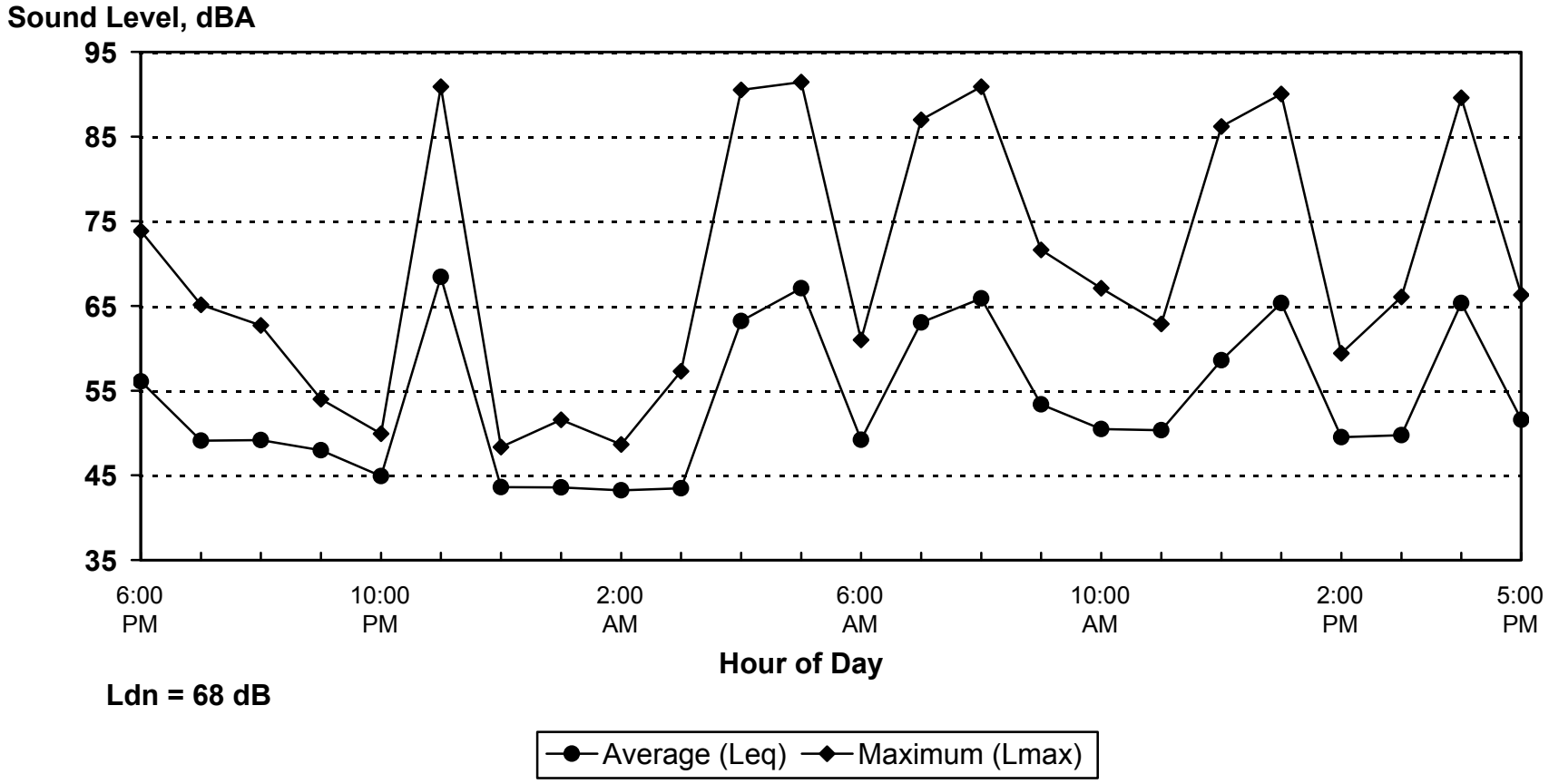
Figure 6
Measured Ambient Noise Levels - Site C
Bohemia Subdivision - Placer County, California
July 11-12, 2005



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